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Electrochemical silylation of phenylacetylene

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Abstract

Electrochemical reduction of chlorotrimethylsilane and dichlorodimethylsilane in the presence of phenylacetylene results in silylated ethynyl and ethenyl derivatives - phenyl(trimethylsilyl)acetylene and trimethylsilylstyrene. Under similar conditions, phenyl(trimethylsilyl)acetylene gives a product which corresponds to the addition of Me3Si- anion to the triple bond. By varying the conditions of the electrolysis (the ratio of the reagents, quantity of electricity passed and on carrying out the electrolysis in ECE-mode), either mono-(up to 82% yield) or disilylated (up to 61% yield) products were obtained. The use of the bifunctional chlorosilane as a silylating reagent results in dimethyl bis(phenylethynyl) silane (20% yield). The active silylating species of the process was shown to be the Me3Si--anions, though some assistance from secondary silyl-radicals cannot be ignored. A mechanism of silylation is discussed.

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Keywords

Chlorosilanes, Electrosynthesis, Hydrosilylation, Phenylacetylene, Silylation